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A SOLUTION TO PROACTIVE PROTECT COOLING EFFICIENCY OF CPU THERMAL FAN

HP INC

A solution to proactive protect cooling efficiency of CPU thermal fan

Abstract

Computer thermal fan is easy to attach dust, while the dust is accumulated, it will have following impact. The CPU performance will downgrade, moreover system hit thermal shutdown due to cooling efficiency is decreasing. The thermal fan will damage if we do not open the case and clean it manually. However, we do not know when should open case to clean it since there is no good warning as well as auto cleaning method for it. Here we provide a solution to solve that and enhance the user experience.

Method

We propose to implement service for this feature by:

- Compensate the CPU thermal fan performance, while fan is attached dust.
- Extend the thermal fan life cycle by decreasing the dust adhesive force as well as automatically clean the computer thermal fan
- Early warning user and computer OEM before thermal fan is going to be damaged.

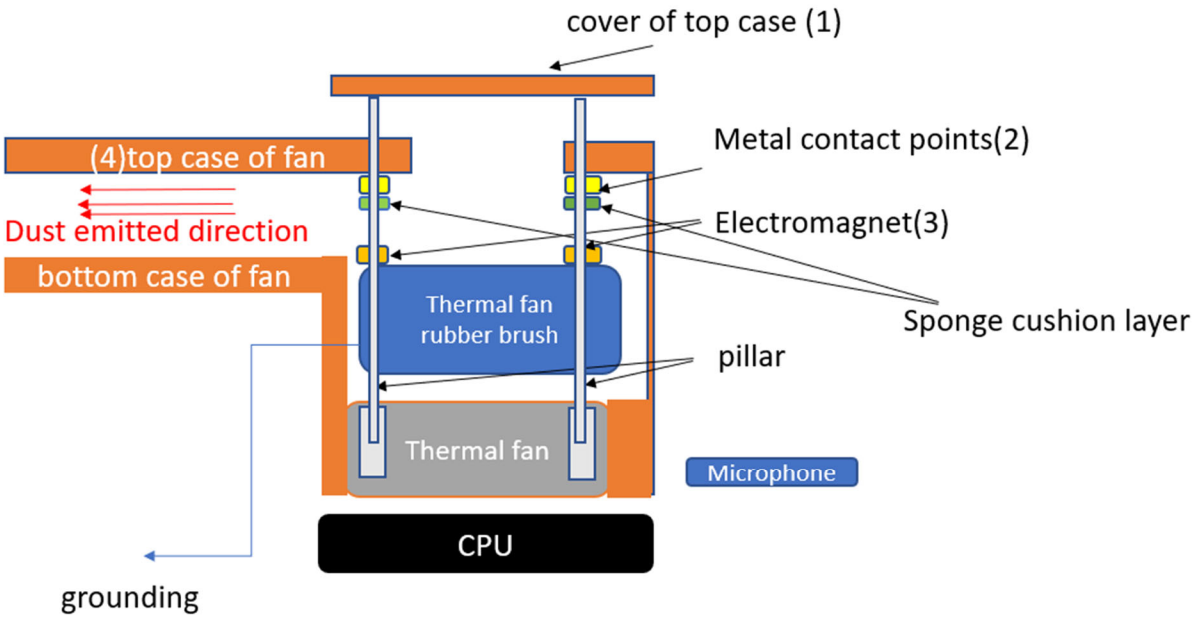
Our solution is constructed by the following key technics:

- Staggered form fan brushes whose material is made by conducted rubber.
- Electromagnetic to pull away the fan brush and fan while thermal fan is working.
- Algorithm1 -- (Cleaning dust)
    - To detect when rubber need to clean thermal fan.
- Algorithm2 --(Speed compensation)
    - To compensate the fan performance while the original thermal table setting is not suitable to system heat dissipation due to fan dust.
    - [Microphone sensor data] and [fan speed data] as two important parameters of Algorithms.

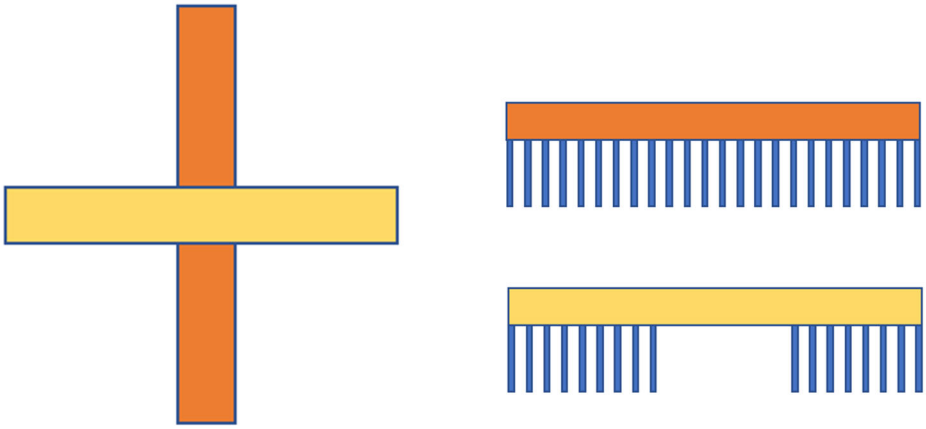
Thermal fan is built with insulation characteristics, so a lot of positive and negative charges will be accumulated on the surface of fan while it is rotating. Because of static electricity, a lot of dust is easily adsorbed to the surface and that will decrease the speed of thermal fan and impact the heat emitted of computer. We use three solutions to protect the CPU overheating.

- Decrease the static electric to decrease dust accumulating.
- Physical Staggered form rubber brush to clean the fan.
- Speed compensation of the fan.

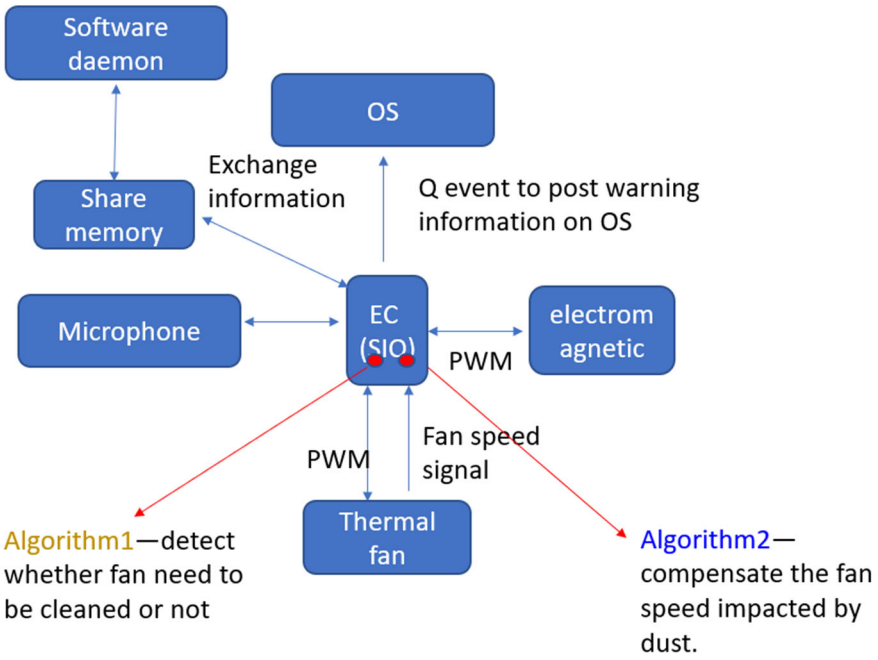
The following is the Structure-side view.



The following is the top view and side view of the brush.

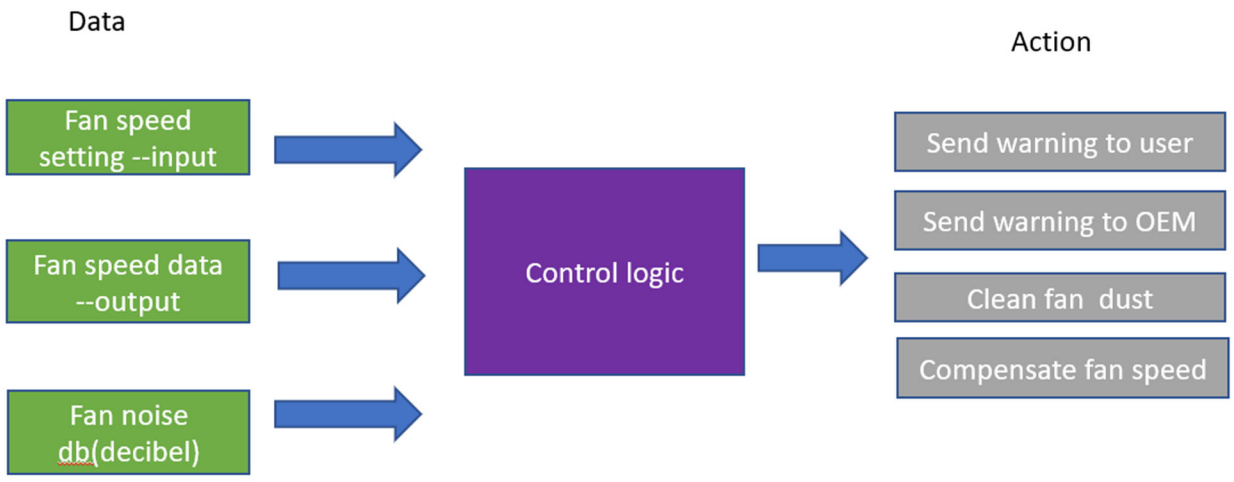


Below is the function flow.



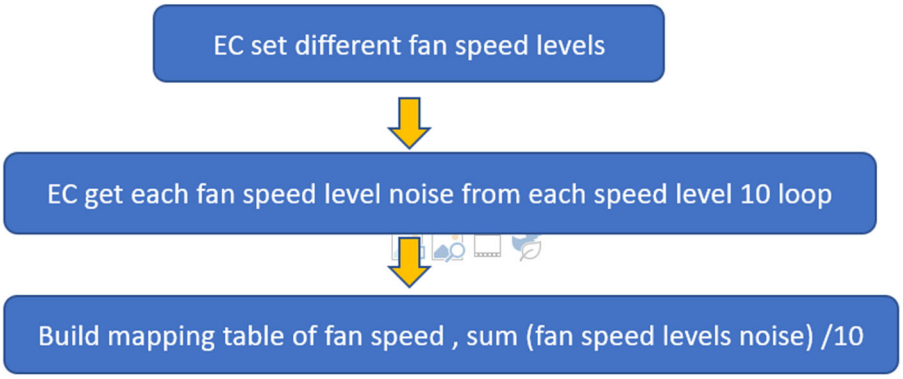
1. When CPU stop working –conduct rubber brush contact with thermal fan to emit the static electronic.
2. When CPU working, EC trigger electronic magnetic working to separate the brush from the fan.
3. When Algorithm1 detect the detect fan need to be cleaned, EC send command to the CPU and fan to do cleaning.
4. When cleaning times >10 secs do algorithm 2
5. Algorithm2 will detect the performance impact of CPU speed and compensate the fan speed.
6. After Algorithm2 process finished, ask software daemon to send information to OEM.

System function block is as below.

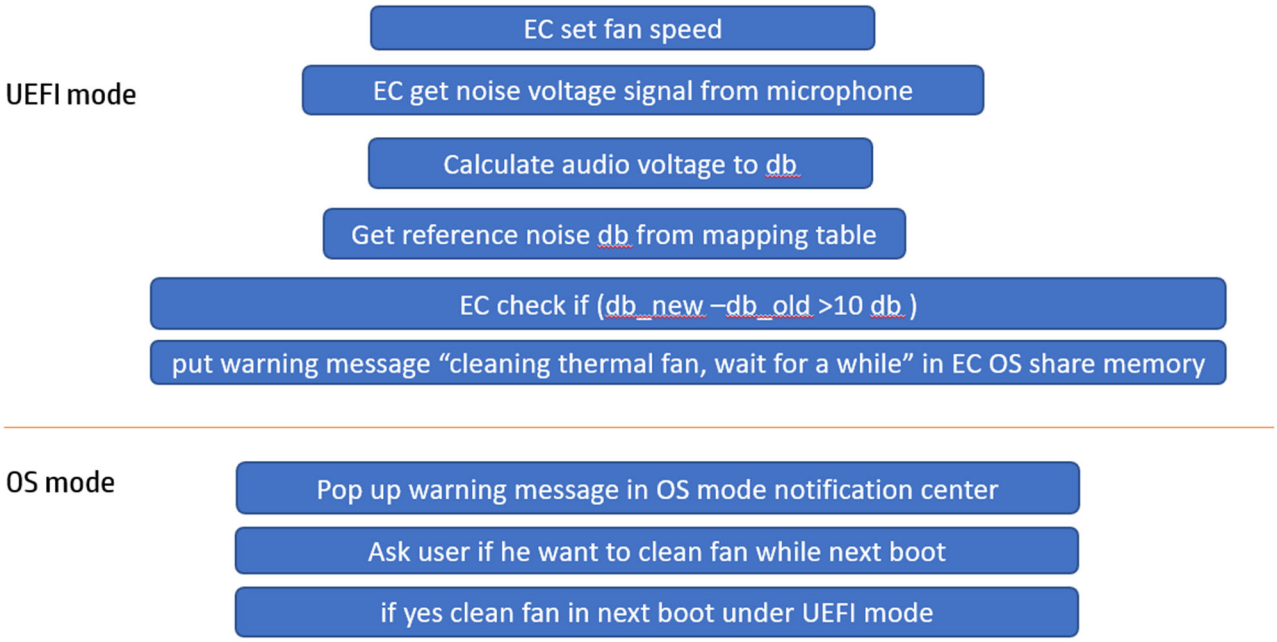


Algorithms

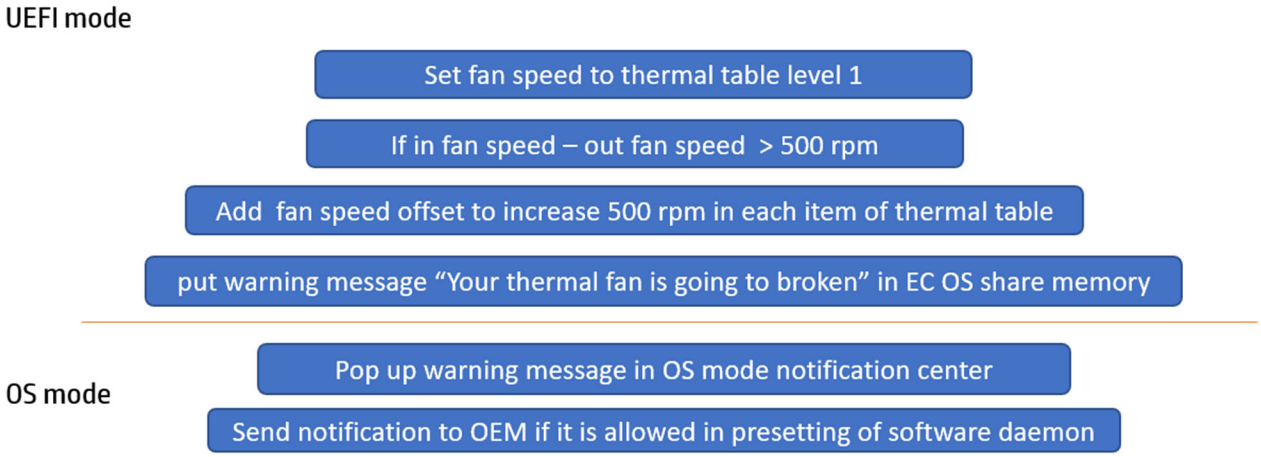
- Algorithm-initial



- Algorithm1-cleaning dust



- Algorithm2 -fan speed compensation



Disclosed by David Ke, Joshua Ho, Eric Lin, HP Inc.